

IN THE CLAIMS:

26 1. (currently amended) A disturbance ~~estimated type~~  
estimated-type control system comprising:

a control object;

disturbance estimating means for estimating a  
disturbance ~~added to an input~~ of the control object ~~based on~~  
in accordance with an input signal ~~to be inputted in~~ into the  
control object and a detection signal detected from the  
control object;

compensating means for compensating for a deviation  
between the detection signal and a target value and for  
outputting a corresponding control signal; and

~~calculating~~ subtracting means for subtracting the  
control signal of the compensating means from a disturbance  
estimated value of ~~by~~ the disturbance estimating means, ~~from~~  
~~the control signal and considering a subtraction result as the~~  
~~input signal, wherein~~

~~a mathematical model (nominal model) of the control~~  
~~object comprising of a state equation and a transfer function~~  
~~is prepared by system identification based on an experiment,~~

~~the compensating means is designed from the~~  
~~mathematical model (nominal model), and~~

~~the disturbance estimating means is prepared from an~~  
~~expanded state equation (expansion system) comprising of a~~

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~~mathematical model (expansion model) taking a disturbance into account with respect to the mathematical model (nominal model).~~

2. (currently amended) A gas compressor control system comprising:

a variable displacement type gas compressor having ~~displacement altering means that is capable of altering a displacement within a compressing chamber and an evaporator;~~

displacement altering means for altering a displacement of gas in the compressing chamber of the variable displacement type gas compressor;

input means for inputting an input signal to be inputted in into the displacement altering means;

detecting means for detecting a detection signal in which at least one piece of information among an corresponding to one of ambient air temperature in a room, an air temperature at an outlet of an the evaporator, a flow of a refrigerant flowing through the variable displacement type gas compressor flow, and a pressure of the refrigerant pressure on a suction side of the compressing chamber a gas compressor and the like is detected;

disturbance estimating means for estimating a disturbance of the variable displacement type gas compressor ~~based on~~ in accordance with the detection signal detected by the detecting means and the input signal input into the displacement altering means;

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compensating means for compensating for a deviation between the detection signal and a target value and for outputting to output a corresponding control signal; and

~~ealeulating~~ subtracting means for subtracting the control signal of the compensating means from a disturbance estimated value of ~~by~~ the disturbance estimating means ~~from~~ ~~the control signal to consider a subtraction result the input~~ ~~signal.~~

3. (currently amended) A method of designing a disturbance ~~estimated type~~ estimated-type control system, comprising the steps of:

providing a control object;

preparing a mathematical model of the control object;

providing an expanded state equation comprised of the mathematical model of the control object and a mathematical model of a disturbance applied to the control object;

designing from the expanded state equation a disturbance estimating device means for estimating a the disturbance added to an input of the control object in accordance with based on an input signal to be inputted into ~~in~~ the control object and a detection signal detected from the control object;

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designing from the mathematical model of the control object a compensating device means for compensating for a deviation between the detection signal and a target value and for outputting a control signal; and

~~calculating means for subtracting the control signal of the compensating device from a disturbance estimated value of by the disturbance estimating device. means from the control signal and considering a subtraction result as the input signal, wherein~~

~~preparing a mathematical model (nominal model) of the control object comprising of a state equation and a transfer function by system identification;~~

~~preparing an expanded state equation (expansion system comprising of the mathematical model and a mathematical model of a disturbance;~~

~~designing the disturbance estimating means from the state equation (expansion system); and~~

~~designing the compensating means from the mathematical model (nominal model).~~

4. (currently amended) A method of designing a disturbance ~~estimated-type~~ estimated-type control system according to ~~claim 3~~, wherein claim 3; further comprising the steps of determining whether or not the expanded state equation ~~(expansion system)~~ is observable and, if it is determined to be unobservable, compulsorily adding an error of

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10% or less to a coefficient corresponding to an A matrix and/or a C matrix of the expanded state equation ~~(expansion system)~~ or to a zero-th dimension term of a transfer function numerator of the mathematical model of the control object and preparing an expansion system including the ~~error~~, error to thereby establish ~~establishing~~ observability.

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5. (new) A disturbance estimating-type control system according to claim 1; further comprising means for designing the compensating means utilizing a first mathematical model of the control object; and means for designing the disturbance estimating means utilizing an expansion system comprised of the mathematical model.

6. (new) A gas compressor control system according to claim 2; wherein the disturbance of the variable displacement type gas compressor comprises a variation in the number of rotations of the variable displacement type gas compressor.

7. (new) A disturbance estimated-type control system comprising:

a control object;

a disturbance estimating device for estimating a disturbance of the control object in accordance with an input signal inputted into the control object and a detection signal detected from the control object;

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a compensator for compensating for a deviation between the detection signal and a preselected value of the detection signal and for outputting a corresponding control signal; and

a subtractor for subtracting the control signal of the compensator from a disturbance estimated value of the disturbance estimating device.

8. (new) A disturbance estimated-type control system according to claim 7; wherein the control object comprises a variable displacement-type gas compressor.

9. (new) A disturbance estimated-type control system according to claim 8; wherein the variable displacement-type gas compressor comprises an evaporator and a compression chamber; and wherein the detection signal comprises one of an air temperature at an outlet of the evaporator and a refrigerant pressure on a suction side of the compression chamber.

10. (new) A gas compressor control system according to claim 7; wherein the disturbance of the variable displacement-type gas compressor comprises a variation in the number of rotations of the variable displacement type gas compressor.